UNIWERSYTET GDAŃSKI

Course title
Wykład dyplomowy - Podstawy inżynierii genetycznej/Diploma lecture - Essentials of genetic engineering

ECTS code
13.3.0908

Name of unit administrating study

Faculty of Chemistry

Studies

Field of study	Type	Form	
Chemistry	Bachelor	Full-time studies	

Teaching staff
Dr hab. Agnieszka Żylicz-Stachula, prof. UG

Forms of classes, the realization and number of hours

A. Forms of classes, in accordance with the UG Rector's regulations
lecture

B. The realization of activities
In-class learning

C. Number of hours
lecture 30 h

ECTS credits

classes 30 h
tutorial classes 5 h
student's own work 15 h
TOTAL: 50 h - 2 ECTS

The academic cycle
2021/2022 summer semester

Type of course
obligatory

Language of instruction
Polish

Teaching methods

Lectures including multimodal presentations

Form and method of assessment and basic criteria for evaluation or examination requirements

A. Final evaluation, in accordance with the UG study regulations
Course completion (with a grade)

B. Assessment methods

test

The basic criteria for evaluation

- final written test consisting of test questions, open tasks and simulation exercises, covering issues mentioned in the lecture's program content
- final grade according to the scale of grades given in the Study Regulations
- supplementary written evaluation for students who did not obtain the required 51% in the first term

Required courses and introductory requirements

A. **Formal requirements** General Chemistry, Organic Chemistry, Biochemistry, General Microbiology
B. **Prerequisites** proper use of the chemical/biological terminology and nomenclature, knowledge of the basic functions and structure of the prokaryotic and eukaryotic cell, knowledge of cellular biochemical processes

Aims of education

- acquainting students with all issues mentioned in the lecture's program content
- acquainting students with the basic properties of biological macromolecules: DNA, RNA and proteins;

- acquainting students with selected mechanisms of genetic regulation in gene expression;
- acquainting students with the current possibilities, limitations and the anticipated trends in modern genetic engineering and molecular biotechnology

Course contents

genetic engineering and molecular biotechnology: concepts, history, achievements, perspectives, threats; recombinant microorganisms and transgenic animals; structure and applications of GFP; PCR as a DNA amplification method and diagnostic tool (definition, selected modifications and applications); nucleic acid isolation techniques; molecular cloning procedures; basic molecular tools (vectors, polymerases, ligases, nucleases and other DNA modifying enzymes); restriction endonucleases and their applications; methods of introducing recombinant DNA into cells; methods of selecting positive bacterial clones; nucleic acid sequencing by the chain termination method (Sanger sequencing); selected gene expression systems;

Bibliography of literature

A. Literature required to pass the course

A.2. Literature for individual studies

1. Węgleński, P.: Genetyka molekularna. Wydawnictwo naukowe PWN 2006
2. Brown, T.A.: Genomy. Wydawnictwo naukowe PWN 2009

B. Extracurricular readings

1. Watson, J.D., Myers, R.M., Caudy, A.A., Witkowski, J.A.: Recombinant DNA. Genes and genomes – a short course. 2007.
2. Buckingham, M.L., Flaws, L.: Molecular diagnostics: Fundamentals, Methods and Clinical Applications. 2007
3. Glick, B.R., Pasternak, J.J., Patten, C.L.: Molecular biotechnology: Principles and applications of recombinant DNA. 2009

Knowledge

1. Understands and describes the structure of DNA, RNA and proteins,
2. Understands and describes the processes of replication, transcription and translation,
3. Describes selected mechanisms of gene expression regulation,
4. Lists, characterizes and understands the methods used in molecular biotechnology and genetic engineering,
5. Lists basic molecular tools used in genetic engineering.

Skills

1. Designs DNA starters and PCR reaction conditions,
2. Analyzes DNA sequences,
3. Identifies the sequences recognized by restriction endonucleases and anticipates the DNA restriction fragments obtained with these enzymes,
4. Lists potential practical applications of the discussed techniques and molecular tools,
5. Proposes the use of specific molecular techniques and molecular tools to solve a problem.

Social competence

1. Understands the need for further education,
2. Being cautious and critical when expressing opinions,
3. Obtains an awareness of the relationship between human genetic material and human health and life span,
4. Realizes and appreciates the possibilities created by modern molecular biotechnology and genetic engineering,
5. Understands social, environmental and economic effects and potential risks posed by modern genetic engineering.